

Dissolved Amino Acids in the Coastal Water of Alexandria

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Summary: The concentration of dissolved amino acids in the surface waters of Alexandria varied from 0.81 to 9.37 mg/l for the unpolluted and polluted waters respectively. Basic and sulphur containing amino acids, together with cysteine, were present in high concentration.

Resumé: La concentration des acides aminiques à la surface des eaux d'Alexandrie en Egypte, varie de 0.81 à 9.37 mg/l pour les eaux non-polluées et polluées respectivement. Les acides aminiques basiques, contenant du soufre aussi que la cysteine, étaient présents avec une concentration élevée.

Introduction

Little is known about the concentration of amino acids and their distribution in the Mediterranean in general and in Alexandria waters in particular.

Materials and Methods

10 hydrographic stations were staffed during July 1974 in the Kayed Bey waters of Alexandria to collect 5 l surface samples for amino acids analyses.

These stations were 1 km apart on a straight line, perpendicular to the shore line, with the first station at 1 km from the shore. Amino acids were co-precipitated with Zirconium phosphate according to the method of Zlobin et al.¹, and the determinations were carried out by the method of Denisova², using a CQ-14 spectrophotometer.

Results and Discussion

The concentration of the dissolved amino acid showed a characteristic pattern of distribution in the form of a relatively high concentration area near the shore (Zone No 1), followed by low concentration area (Zone No 2), then the most outer area of highest concentration (Zone No 3).

In the first Zone (stations 1-5), the concentration of amino acids varied from 2.08 to 2.55 mg/l, with strong predominance of histidine, arginine and glutamine (58-60%). Glutamic acid, threonine, methionine, valine and tryptophan were present at lower concentrations (13.3-17.3%).

The second zone (stations 6-8) exhibited low amino acid content (0.81-0.97 mg/l) with strong predominance of cysteine (55-59.3%). Glutamic acid was not detected and only threonine was present at low concentrations (8.6-9.3%).

The third zone (stations 9,10) represented the highest concentration (9.37 and 6.87 mg/l) with strong predominance of glutathione, cysteine, histidine, arginine and glutamine (70.4-83.6%). Proline and tyrosine were present only in this zone, but at low concentrations (1.3-3.7%). This high concentration can be attributed to sewage pollution. Aspartic acid, serine and glycine have not been identified in any samples collected, while alanine was detected in all samples (0.87-6.74%).

The average concentration recorded at Kayed Bey ($3.067+2.667$ mg/l) is much more than the extreme values observed by Kurelec et al.³ in the North Adriatic Sea (0.32 mg/l) and also that of Daumas⁴ in the Gulf of Marseille (0.33 mg/l).

Conclusion

The absence of aliphatic amino acids of low molecular weight serine and glycine together with aspartic acid from all the samples, may indicate that the decomposition of protein and peptide did not proceed to its end. Varying with position, samples were characterized by predominance of histidine, arginine, glutamine and cysteine.

References

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- 3- B. Kurelec, M. Rijares, S. Kveder, R.K. Zahn, S. Brivic and W.E.G. Muller, Dissolved amino acids in the waters of Northern Adriatic Sea. *Thalassia Jugoslavica* 13 (½) (1977) 69-77.
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Emara, H.I.

"Dissolved amino acids in the coastal water of Alexandria"

Paper presented by H. Emara (Egypt)

Discussion

- B. Čosović: What is the content of total organic carbon in the polluted area where you obtained about 10 mg/l of amino acids?
- H. Emara: The concentration of total organic matter in the polluted area by the permanganate method was about 20 mg/l, while that in the unpolluted area was around 1 mg/l.
- H.W. Nürnberg: What is the explanation for the amino acids pattern I elevated, II low and III (station 9, 10) particularly high? Does the DOM-pattern show a parallel course?
- H. Emara: The explanation for the amino acid pattern I elevated, II low, III highest concentration, is that the area under consideration resembles a bay where clockwise circulation takes place inside the bay, carrying open sea water with low amino acid content (zone III). In addition sewage pipelines about one km long extend

in the western vicinity of the area at a depth of 16 m and strongly push sewage to far distances; no doubt, the area (zone III) is affected by the West-East Mediterranean current. Concerning the DOM pattern, unfortunately I did not measure this parameter with amino acids.

V. Žutić:

- a) Did you recognize total dissolved amino acids (free, proteins, peptides) only?
- b) Was the contribution of in situ production of proteinous material (primarily production) important?

H. Emara:

- a) I recognized free and combined amino acids together as total amino acids.
- b) Yes, the contribution of in situ production of proteinous material was important.